AMENDMENTS TO THE CLAIMS

1. (ORIGINAL) A method in an IPv6 mobile node, the method including:

first generating a tag that uniquely identifies the IPv6 mobile node to an IPv6 gateway having an IPv4 gateway address and an IPv6 gateway address, the IPv6 gateway configured for transferring packets between an IPv4 network via the corresponding IPv4 gateway address and an IPv6 network;

second generating a first IPv6 packet that specifies a request for a valid IPv6 care-of address that is reachable in the IPv6 network via the IPv6 gateway, the first IPv6 packet having an IPv6 source address field that specifies the tag and an IPv6 destination address field that specifies the IPv6 gateway address;

first encapsulating the first IPv6 packet in a first IPv4 packet having an IPv4 header including a destination address field that specifies the IPv4 gateway address, a source address field specifying a mobile node IPv4 address for the IPv6 mobile node, and a transport header having a source port field specifying a prescribed transport layer port for the IPv6 mobile node, and a destination port field specifying a prescribed transport layer port for the IPv6 gateway used for identifying transfer of the IPv6 packet between the IPv4 network and the IPv6 network;

first outputting the first IPv4 packet carrying the first IPv6 packet to the IPv6 gateway via the IPv4 network;

receiving a second IPv4 packet carrying a second IPv6 packet that indicates an acknowledgement by the IPv6 gateway for the valid IPv6 care-of address;

third generating a third IPv6 packet for a destination node reachable via the IPv6 network;

second encapsulating the third IPv6 packet in a third IPv4 packet having the IPv4 header;

and

second outputting the third IPv4 packet onto the IPv4 network for transfer of the third IPv6 packet onto the IPv6 network by the IPv6 gateway.

2. (ORIGINAL) The method of claim 1, wherein the first generating step includes specifying within the tag the mobile node IPv4 address, the prescribed transport layer port for the

IPv6 mobile node, the IPv4 gateway address, and the prescribed transport layer port for the IPv6 gateway.

3. (ORIGINAL) The method of claim 2, wherein the third generating step further includes specifying within the tag a prescribed protocol identifier recognizable by the IPv6 gateway as specifying insertion of the valid IPv6 care-of address in the corresponding IPv6 source address field prior to outputting the corresponding IPv6 packet onto the IPv6 network.

4. (ORIGINAL) The method of claim 3, wherein the third generating step includes inserting the tag within the IPv6 source address field of the third IPv6 packet.

5. (ORIGINAL) The method of claim 2, wherein the receiving step includes obtaining the valid IPv6 care-of address from the second IPv6 packet.

6. (ORIGINAL) The method of claim 5, wherein the third generating step includes inserting the valid IPv6 care-of address in the IPv6 source address field of the third IPv6 packet.

7. (ORIGINAL) The method of claim 1, wherein the mobile node IPv4 address is a private IPv4 address, the prescribed transport layer port for the IPv6 mobile node is a private TCP port, the IPv4 gateway is a public IPv4 address, and the prescribed transport layer port for the IPv6 gateway is a public TCP port.

8. (ORIGINAL) A method in an IPv6 router, the method including:

attaching to an IPv4 network using an IPv4 gateway address and an IPv6 network using an IPv6 address;

receiving from the IPv4 network a first IPv4 packet having a destination address field specifying the IPv4 gateway address, a destination port field specifying a prescribed transport layer gateway port, a source address field specifying an IPv4 address and a source port field

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specifying a second transport layer port;

recovering an IPv6 packet from the IPv4 packet in response to detecting the prescribed transport layer gateway port in the destination port field;

detecting within the IPv6 packet an IPv6 source address field that specifies an IPv6 tag address that uniquely identifies an IPv6 mobile node, and a request for a valid IPv6 care-of address that is reachable in the IPv6 network via the IPv6 router;

assigning the valid IPv6 care-of address in response to the request; and

outputting via the IPv4 network a second IPv4 packet, the second IPv4 packet carrying a second IPv6 packet generated by the IPv6 router in response to the assigning step and that acknowledges the request for the valid IPv6 care-of address, the second IPv4 packet specifying the IPv4 address of the IPv6 mobile node in the corresponding destination address field and the second transport layer port in the corresponding destination port field.

9. (ORIGINAL) The method of claim 8, wherein the assigning includes generating a binding entry that associates the valid IPv6 care-of address with at least a prescribed portion of the IPv6 tag address that uniquely identifies the IPv6 mobile node.

10. (ORIGINAL) The method of claim 9, wherein the prescribed portion of the IPv6 tag address includes a second IPv4 address used by the IPv6 mobile node as a source address for identifying the IPv6 mobile node, a third IPv4 address used by the IPv6 mobile node as a destination address for identifying the IPv6 router, a third transport layer port value used as a source port by the IPv6 mobile node in establishing an IPv4 connection with the IPv6 router, and a fourth transport layer port value used by the IPv6 mobile node as a destination port for identifying the IPv6 router via the IPv4 connection.

11. (ORIGINAL) The method of claim 10, wherein the second IPv4 address and the third transport layer port specified in the IPv6 tag address are private values and the IPv4 address and the second transport layer port are public values, the generating further including associating

within the binding entry the IPv4 address and the second transport layer port.

12. (ORIGINAL) The method of claim 8, wherein the outputting step includes inserting within the second IPv6 packet the valid IPv6 care-of address for use by the IPv6 mobile node.

13. (ORIGINAL) The method of claim 9, further comprising:

receiving from the IPv4 network a third IPv4 packet having a destination address field specifying the IPv4 gateway address, and a destination port field specifying the prescribed transport layer gateway port;

recovering a third IPv6 packet from the IPv4 packet, in response to detecting the prescribed transport layer gateway port in the destination port field, that specifies the IPv6 tag address in the corresponding IPv6 source address field and a valid IPv6 address in a corresponding IPv6 destination address field;

accessing the binding entry in response to detecting that the IPv6 tag address is not a valid IPv6 address, and retrieving the valid IPv6 care-of address from the binding entry based on detecting a match between the IPv6 tag address in the corresponding IPv6 source address field of the third IPv6 packet and the corresponding at least a prescribed portion of the IPv6 tag address;

outputting the third IPv6 packet, after having overwritten the valid IPv6 care-of address into the corresponding IPv6 source address field, onto the IPv6 network.

14. (ORIGINAL) The method of claim 8, wherein the assigning step includes generating a binding entry that associates the valid IPv6 care-of address with at least one of at least a prescribed portion of the IPv6 tag address that uniquely identifies the IPv6 mobile node, and IPv4 connection state information including the IPv4 gateway address, a first TCP port as the prescribed transport layer gateway port, the IPv4 address and a second TCP port as the second transport layer port.

15. (ORIGINAL) The method of claim 14, further comprising:

receiving a third IPv6 packet from the IPv6 network and that has a corresponding IPv6 destination address field that specifies the valid IPv6 care-of address;

retrieving the IPv4 connection state information from the binding entry based on the valid IPv6 care-of address specified in the IPv6 destination address field of the third IPv6 packet;

encapsulating the third IPv6 packet in a third IPv4 packet that specifies the IPv4 connection state information, including specifying the IPv4 address and the second transport layer port in the corresponding destination address field and the corresponding destination port field, respectively; and

outputting the third IPv4 packet onto the IPv4 network.

16. (ORIGINAL) An IPv6 mobile node comprising:

first means for generating a tag that uniquely identifies the IPv6 mobile node to an IPv6 gateway having an IPv4 gateway address and an IPv6 gateway address, the IPv6 gateway configured for transferring packets between an IPv4 network via the corresponding IPv4 gateway address and an IPv6 network;

second means for generating a first IPv6 packet that specifies a request for a valid IPv6 care-of address that is reachable in the IPv6 network via the IPv6 gateway, the first IPv6 packet having an IPv6 source address field that specifies the tag and an IPv6 destination address field that specifies the IPv6 gateway address;

means for encapsulating the first IPv6 packet in a first IPv4 packet having an IPv4 header including a destination address field that specifies the IPv4 gateway address, a source address field specifying a mobile node IPv4 address for the IPv6 mobile node, and a transport header having a source port field specifying a prescribed transport layer port for the IPv6 mobile node, and a destination port field specifying a prescribed transport layer port for the IPv6 gateway used for identifying transfer of the IPv6 packet between the IPv4 network and the IPv6 network;

means for outputting the first IPv4 packet carrying the first IPv6 packet to the IPv6 gateway via the IPv4 network, the outputting means configured for receiving a second IPv4

packet carrying a second IPv6 packet that indicates an acknowledgement by the IPv6 gateway for the valid IPv6 care-of address;

the second means configured for generating a third IPv6 packet for a destination node reachable via the IPv6 network;

the encapsulating means configured for encapsulating the third IPv6 packet in a third IPv4 packet having the IPv4 header; and

the outputting means configured for outputting the third IPv4 packet onto the IPv4 network for transfer of the third IPv6 packet onto the IPv6 network by the IPv6 gateway.

17. (ORIGINAL) The node of claim 16, wherein the first means is configured for specifying within the tag the mobile node IPv4 address, the prescribed transport layer port for the IPv6 mobile node, the IPv4 gateway address, and the prescribed transport layer port for the IPv6 gateway.

18. (ORIGINAL) The node of claim 17, wherein first means is configured for specifying within the tag a prescribed protocol identifier recognizable by the IPv6 gateway as specifying insertion of the valid IPv6 care-of address in the corresponding IPv6 source address field prior to outputting the corresponding IPv6 packet onto the IPv6 network.

19. (ORIGINAL) The node of claim 18, wherein the second means is configured for inserting the tag within the IPv6 source address field of the third IPv6 packet.

20. (ORIGINAL) The node of claim 17, wherein the outputting means is configured for obtaining the valid IPv6 care-of address from the second IPv6 packet.

21. (ORIGINAL) The node of claim 20, wherein the second means is configured for inserting the valid IPv6 care-of address in the IPv6 source address field of the third IPv6 packet.

22. (ORIGINAL) The node of claim 16, wherein the mobile node IPv4 address is a private IPv4 address, the prescribed transport layer port for the IPv6 mobile node is a private TCP port, the IPv4 gateway is a public IPv4 address, and the prescribed transport layer port for the IPv6 gateway is a public TCP port.

23. (ORIGINAL) An IPv6 router including:

means for connecting to an IPv4 network using an IPv4 gateway address and an IPv6 network using an IPv6 address, the connecting means configured for receiving from the IPv4 network a first IPv4 packet having a destination address field specifying the IPv4 gateway address, a destination port field specifying a prescribed transport layer gateway port, a source address field specifying an IPv4 address and a source port field specifying a second transport layer port;

means for recovering an IPv6 packet from the IPv4 packet in response to detecting the prescribed transport layer gateway port in the destination port field;

means for detecting within the IPv6 packet an IPv6 source address field that specifies an IPv6 tag address that uniquely identifies an IPv6 mobile node, and a request for a valid IPv6 care-of address that is reachable in the IPv6 network via the IPv6 router;

means for assigning the valid IPv6 care-of address in response to the request;

the connecting means configured for outputting via the IPv4 network a second IPv4 packet, the second IPv4 packet carrying a second IPv6 packet generated by the IPv6 router and that acknowledges the request for the valid IPv6 care-of address, the second IPv4 packet specifying the IPv4 address of the IPv6 mobile node in the corresponding destination address field and the second transport layer port in the corresponding destination port field.

24. (ORIGINAL) The router of claim 23, wherein the assigning means is configured for generating a binding entry that associates the valid IPv6 care-of address with at least a prescribed portion of the IPv6 tag address that uniquely identifies the IPv6 mobile node.

25. (ORIGINAL) The router of claim 24, wherein the prescribed portion of the IPv6 tag address includes a second IPv4 address used by the IPv6 mobile node as a source address for identifying the IPv6 mobile node, a third IPv4 address used by the IPv6 mobile node as a destination address for identifying the IPv6 router, a third transport layer port value used as a source port by the IPv6 mobile node in establishing an IPv4 connection with the IPv6 router, and a fourth transport layer port value used by the IPv6 mobile node as a destination port for identifying the IPv6 router via the IPv4 connection.

26. (ORIGINAL) The router of claim 25, wherein the second IPv4 address and the third transport layer port specified in the IPv6 tag address are private values and the IPv4 address and the second transport layer port are public values, the assigning means configured for associating within the binding entry the IPv4 address and the second transport layer port.

27. (ORIGINAL) The router of claim 23, wherein the connecting means configured for inserting within the second IPv6 packet the valid IPv6 care-of address for use by the IPv6 mobile node.

28. (ORIGINAL) The router of claim 24, wherein:

the connecting means is configured for receiving from the IPv4 network a third IPv4 packet having a destination address field specifying the IPv4 gateway address, and a destination port field specifying the prescribed transport layer gateway port;

the recovering means is configured for recovering a third IPv6 packet from the IPv4 packet, in response to detecting the prescribed transport layer gateway port in the destination port field, that specifies the IPv6 tag address in the corresponding IPv6 source address field and a valid IPv6 address in a corresponding IPv6 destination address field;

the connecting means is configured for accessing the binding entry in response to detecting that the IPv6 tag address is not a valid IPv6 address, and retrieving the valid IPv6 care-of address from the binding entry based on detecting a match between the IPv6 tag address in the

corresponding IPv6 source address field of the third IPv6 packet and the corresponding at least a prescribed portion of the IPv6 tag address;

the connecting means configured for outputting the third IPv6 packet, after having overwritten the valid IPv6 care-of address into the corresponding IPv6 source address field, onto the IPv6 network.

29. (ORIGINAL) The router of claim 23, wherein the assigning means is configured for generating a binding entry that associates the valid IPv6 care-of address with at least one of at least a prescribed portion of the IPv6 tag address that uniquely identifies the IPv6 mobile node, and IPv4 connection state information including the IPv4 gateway address, a first TCP port as the prescribed transport layer gateway port, the IPv4 address and a second TCP port as the second transport layer port.

30. (ORIGINAL) The router of claim 29, wherein:

the connecting means is configured for receiving a third IPv6 packet from the IPv6 network and that has a corresponding IPv6 destination address field that specifies the valid IPv6 care-of address;

the connecting means including means for retrieving the IPv4 connection state information from the binding entry based on the valid IPv6 care-of address specified in the IPv6 destination address field of the third IPv6 packet;

the connecting means including means for encapsulating the third IPv6 packet in a third IPv4 packet that specifies the IPv4 connection state information, including specifying the IPv4 address and the second transport layer port in the corresponding destination address field and the corresponding destination port field, respectively;

the connecting means outputting the third IPv4 packet onto the IPv4 network.

31. (ORIGINAL) A computer readable medium having stored thereon sequences of instructions for outputting an IPv4 packet by an IPv6 mobile node, the sequences of instructions

including instructions for:

first generating a tag that uniquely identifies the IPv6 mobile node to an IPv6 gateway having an IPv4 gateway address and an IPv6 gateway address, the IPv6 gateway configured for transferring packets between an IPv4 network via the corresponding IPv4 gateway address and an IPv6 network;

second generating a first IPv6 packet that specifies a request for a valid IPv6 care-of address that is reachable in the IPv6 network via the IPv6 gateway, the first IPv6 packet having an IPv6 source address field that specifies the tag and an IPv6 destination address field that specifies the IPv6 gateway address;

first encapsulating the first IPv6 packet in a first IPv4 packet having an IPv4 header including a destination address field that specifies the IPv4 gateway address, a source address field specifying a mobile node IPv4 address for the IPv6 mobile node, and a transport header having a source port field specifying a prescribed transport layer port for the IPv6 mobile node, and a destination port field specifying a prescribed transport layer port for the IPv6 gateway used for identifying transfer of the IPv6 packet between the IPv4 network and the IPv6 network;

first outputting the first IPv4 packet carrying the first IPv6 packet to the IPv6 gateway via the IPv4 network;

receiving a second IPv4 packet carrying a second IPv6 packet that indicates an acknowledgement by the IPv6 gateway for the valid IPv6 care-of address;

third generating a third IPv6 packet for a destination node reachable via the IPv6 network;

second encapsulating the third IPv6 packet in a third IPv4 packet having the IPv4 header;

and

second outputting the third IPv4 packet onto the IPv4 network for transfer of the third IPv6 packet onto the IPv6 network by the IPv6 gateway.

32. (ORIGINAL) The medium of claim 31, wherein the first generating step includes specifying within the tag the mobile node IPv4 address, the prescribed transport layer port for the IPv6 mobile node, the IPv4 gateway address, and the prescribed transport layer port for the IPv6

gateway.

33. (ORIGINAL) The medium of claim 32, wherein the third generating step further includes specifying within the tag a prescribed protocol identifier recognizable by the IPv6 gateway as specifying insertion of the valid IPv6 care-of address in the corresponding IPv6 source address field prior to outputting the corresponding IPv6 packet onto the IPv6 network.

34. (ORIGINAL) The medium of claim 33, wherein the third generating step includes inserting the tag within the IPv6 source address field of the third IPv6 packet.

35. (ORIGINAL) The medium of claim 32, wherein the receiving step includes obtaining the valid IPv6 care-of address from the second IPv6 packet.

36. (ORIGINAL) The medium of claim 35, wherein the third generating step includes inserting the valid IPv6 care-of address in the IPv6 source address field of the third IPv6 packet.

37. (ORIGINAL) The medium of claim 31, wherein the mobile node IPv4 address is a private IPv4 address, the prescribed transport layer port for the IPv6 mobile node is a private TCP port, the IPv4 gateway is a public IPv4 address, and the prescribed transport layer port for the IPv6 gateway is a public TCP port.

38. (ORIGINAL) A computer readable medium having stored thereon sequences of instructions for outputting an IPv4 packet by an IPv6 router, the sequences of instructions including instructions for:

attaching to an IPv4 network using an IPv4 gateway address and an IPv6 network using an IPv6 address;

receiving from the IPv4 network a first IPv4 packet having a destination address field specifying the IPv4 gateway address, a destination port field specifying a prescribed transport

layer gateway port, a source address field specifying an IPv4 address and a source port field specifying a second transport layer port;

recovering an IPv6 packet from the IPv4 packet in response to detecting the prescribed transport layer gateway port in the destination port field;

detecting within the IPv6 packet an IPv6 source address field that specifies an IPv6 tag address that uniquely identifies an IPv6 mobile node, and a request for a valid IPv6 care-of address that is reachable in the IPv6 network via the IPv6 router;

assigning the valid IPv6 care-of address in response to the request; and

outputting via the IPv4 network a second IPv4 packet, the second IPv4 packet carrying a second IPv6 packet generated by the IPv6 router in response to the assigning step and that acknowledges the request for the valid IPv6 care-of address, the second IPv4 packet specifying the IPv4 address of the IPv6 mobile node in the corresponding destination address field and the second transport layer port in the corresponding destination port field.

39. (ORIGINAL) The medium of claim 38, wherein the assigning includes generating a binding entry that associates the valid IPv6 care-of address with at least a prescribed portion of the IPv6 tag address that uniquely identifies the IPv6 mobile node.

40. (ORIGINAL) The medium of claim 39, wherein the prescribed portion of the IPv6 tag address includes a second IPv4 address used by the IPv6 mobile node as a source address for identifying the IPv6 mobile node, a third IPv4 address used by the IPv6 mobile node as a destination address for identifying the IPv6 router, a third transport layer port value used as a source port by the IPv6 mobile node in establishing an IPv4 connection with the IPv6 router, and a fourth transport layer port value used by the IPv6 mobile node as a destination port for identifying the IPv6 router via the IPv4 connection.

41. (ORIGINAL) The medium of claim 40, wherein the second IPv4 address and the third transport layer port specified in the IPv6 tag address are private values and the IPv4 address

and the second transport layer port are public values, the generating further including associating within the binding entry the IPv4 address and the second transport layer port.

42. (ORIGINAL) The medium of claim 38, wherein the outputting step includes inserting within the second IPv6 packet the valid IPv6 care-of address for use by the IPv6 mobile node.

43. (CURRENTLY AMENDED) The medium of claim [[9]] 39, further comprising instructions for:

receiving from the IPv4 network a third IPv4 packet having a destination address field specifying the IPv4 gateway address, and a destination port field specifying the prescribed transport layer gateway port;

recovering a third IPv6 packet from the IPv4 packet, in response to detecting the prescribed transport layer gateway port in the destination port field, that specifies the IPv6 tag address in the corresponding IPv6 source address field and a valid IPv6 address in a corresponding IPv6 destination address field;

accessing the binding entry in response to detecting that the IPv6 tag address is not a valid IPv6 address, and retrieving the valid IPv6 care-of address from the binding entry based on detecting a match between the IPv6 tag address in the corresponding IPv6 source address field of the third IPv6 packet and the corresponding at least a prescribed portion of the IPv6 tag address;

outputting the third IPv6 packet, after having overwritten the valid IPv6 care-of address into the corresponding IPv6 source address field, onto the IPv6 network.

44. (ORIGINAL) The medium of claim 38, wherein the assigning step includes generating a binding entry that associates the valid IPv6 care-of address with at least one of at least a prescribed portion of the IPv6 tag address that uniquely identifies the IPv6 mobile node, and IPv4 connection state information including the IPv4 gateway address, a first TCP port as the prescribed transport layer gateway port, the IPv4 address and a second TCP port as the second

transport layer port.

45. (ORIGINAL) The medium of claim 44, further comprising instructions for:

receiving a third IPv6 packet from the IPv6 network and that has a corresponding IPv6 destination address field that specifies the valid IPv6 care-of address;

retrieving the IPv4 connection state information from the binding entry based on the valid IPv6 care-of address specified in the IPv6 destination address field of the third IPv6 packet;

encapsulating the third IPv6 packet in a third IPv4 packet that specifies the IPv4 connection state information, including specifying the IPv4 address and the second transport layer port in the corresponding destination address field and the corresponding destination port field, respectively; and

outputting the third IPv4 packet onto the IPv4 network.